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10/580,683	05/26/2006	Ryuji Kobayashi	8028-1160	4993

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EXAMINER	
NIU, XINNING	

ART UNIT	PAPER NUMBER
2828	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/580,683	KOBAYASHI, RYUJI	
	Examiner	Art Unit	
	XNNING NIU	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07/09/2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 9, 14 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The examiner believes the average strain equation in claim 9 is indefinite because the equation does not calculate the average strain of all the layers but instead calculates the sum of the strain for n semiconductor layers.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 9-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakata et al. (5,847,415) in view of Naka et al. (4,701,927), G. P. Agrawal Semiconductor Lasers Past, Present, and Future. American Institute of Physics, 1995 and S. L. Chuang. Physics of Optoelectronic Devices. New York: John Wile & Sons, 1995.

4. Regarding claim 9, Sakata et al. disclose: a double hetero mesa stripe serving as a first semiconductor laminated product including at least strained multiple quantum well active layer formed by selective growth on a semiconductor substrate (Figure 4, Col 6, Lines 1-67); and recombined layers (the two other mesa stripe layers on either side of the middle active layer) serving as second semiconductor laminated products simultaneously formed on both sides of the double hetero mesa strip at a predetermined interval in the selective growth (Figure 4, Col 6, Lines 1-67). Equation 1 which deals with the average strain of multiple layers is inherent to the structure of Sakata et al. Equation 2 which deals with critical thickness are inherent to a strained semiconductor layers (please see G.P. Agrawal, pages 17-18). Sakata et al. do not disclose: a cap layer formed on cladding layer (34), average strain amount of double hetero mesa stripe is a compression strain and an average strain amount of the recombination layer is a tensile strain. Naka et al. disclose: cap layer (5) formed on a clad layer (4) (Figure 1,

Col 1, Lines 29-55). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the laser of Sakata et al. by forming a cap layer above the cladding layer in order to inject more carriers into the active region.

5. Chuang discloses: compressively strained and tensile strained quantum well lasers (page 437-444), specifically compressively strained quantum well structure achieves a lower threshold current density (page 437) and favors TE polarization (page 444), while tensile strained quantum well active layers favors TM polarization (page 444). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the laser of Sakata et al. by compressively staining the mesa stripe in order to achieve a lower threshold current and to choose either tensile or compressive strain for the recombination layers because the recombination layers only serve to stop current spreading and would not affect the laser output.

6. Regarding claim 10, Sakata et al. disclose: selective growth layers includes at least an optical confinement layer and a quantum well active layer (Figure 4, Col 6, Lines 1-67).

7. Regarding claim 11, Sakata et al. disclose: InGaAsP active layer and InGaAsP optical confinement layers. Sakata et al. do not disclose: selective growth layers contains AlInAs or AlGaInAs. It would have been obvious to one having ordinary skill in the art at the time the invention was made to change the material in order to change the output wavelength, since it has been held to be within the

general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

8. Regarding claim 12, Sakata et al. disclose: InGaAsP active layer and InGaAsP optical confinement layers. Sakata et al. do not disclose: selective growth layers contains AlInAs or AlGaInAs. It would have been obvious to one having ordinary skill in the art at the time the invention was made to change the material in order to change the output wavelength, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

9. Regarding claim 13, Sakata et al. disclose: distance between the double hetero-mesa stripe and the recombination layer (Figure 4, see rejection for claim 1). Sakata et al. do not disclose distance between the double hetero-mesa stripe and the recombination layer is 15 μm or less. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the distance between the mesa stripe and the recombination layers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

10. Regarding claim 14, Sakata et al. disclose: forming a pair of stripe shaped dielectric masks on a semiconductor substrate, a double hetero mesa stripe serving as a first semiconductor laminated product including at least strained multiple quantum well active layer formed by selective growth on a semiconductor substrate (Figure 4, Col 6, Lines 1-67); and recombined layers (the two other mesa stripe layers on either side of the middle active layer) serving as second semiconductor laminated products simultaneously formed on both sides of the double hetero mesa strip at a predetermined interval in the selective growth (Figure 4, Col 6, Lines 1-67). Equation 1 which deals with the average strain of multiple layers is inherent to the structure of Sakata et al. Equation 2 which deals with critical thickness are inherent to a strained semiconductor layers (please see G.P. Agrawal, pages 17-18). Sakata et al. do not disclose: a cap layer formed on cladding layer (34), average strain amount of double hetero mesa stripe is a compression strain and an average strain amount of the recombination layer is a tensile strain. Naka et al. disclose: cap layer (5) formed on a clad layer (4) (Figure 1, Col 1, Lines 29-55). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the laser of Sakata et al. by forming a cap layer above the cladding layer in order to inject more carriers into the active region.

11. Chuang discloses: compressively strained and tensile strained quantum well lasers (page 437-444), specifically compressively strained quantum well structure achieves a lower threshold current density (page 437) and favors TE polarization (page 444), while tensile strained quantum well active layers favors TM polarization (page

444). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the laser of Sakata et al. by compressively staining the mesa stripe in order to achieve a lower threshold current and to choose either tensile or compressive strain for the recombination layers because the recombination layers only serve to stop current spreading and would not affect the laser output.

12. Regarding claim 15, Sakata et al. disclose: selective growth layers includes at least an optical confinement layer and a quantum well active layer (Figure 4, Col 6, Lines 1-67).

13. Regarding claim 16, Sakata et al. disclose: InGaAsP active layer and InGaAsP optical confinement layers. Sakata et al. do not disclose: selective growth layers contains AlInAs or AlGaInAs. It would have been obvious to one having ordinary skill in the art at the time the invention was made to change the material in order to change the output wavelength, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

14. Regarding claim 17, Sakata et al. disclose: InGaAsP active layer and InGaAsP optical confinement layers. Sakata et al. do not disclose: selective growth layers contains AlInAs or AlGaInAs. It would have been obvious to one having ordinary

skill in the art at the time the invention was made to change the material in order to change the output wavelength, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

15. Regarding claim 18, Sakata et al. disclose: distance between the double hetero-mesa stripe and the recombination layer (Figure 4, see rejection for claim 1). Sakata et al. do not disclose distance between the double hetero-mesa stripe and the recombination layer is 15 μm or less. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the distance between the mesa stripe and the recombination layers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

16. Regarding claim 19, Sakata et al. disclose: first optical confinement layer (32); quantum well active layer (33) on the first optical confinement layer; second optical confinement layer (34) (Figure 4, Col 6, Lines 1-67). Sakata et al. do not disclose: a cap layer formed on cladding layer (34). Naka et al. disclose: cap layer (5) formed on a clad layer (4) (Figure 1, Col 1, Lines 29-55). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the laser of Sakata

et al. by forming a cap layer above the cladding layer in order to inject more carriers into the active region.

17. Regarding claim 20, Sakata et al. disclose the claimed limitations except the claimed materials for the various layers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to change the material in order to change the output wavelength, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

18. Regarding claim 21, Sakata et al. disclose: p-type InP current blocking layer (37) is provided on both sides of the double hetero mesa stripe; p-type cladding layer (39) is formed above the double hetero mesa stripe (Figure 4, Col 6, Lines 1-67).

19. Regarding claim 22, Sakata et al. disclose: first optical confinement layer (32); quantum well active layer (33) on the first optical confinement layer; second optical confinement layer (34) (Figure 4, Col 6, Lines 1-67). Sakata et al. do not disclose: a cap layer formed on cladding layer (34). Naka et al. disclose: cap layer (5) formed on a clad layer (4) (Figure 1, Col 1, Lines 29-55). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the laser of Sakata

et al. by forming a cap layer above the cladding layer in order to inject more carriers into the active region.

20. Regarding claim 23, Sakata et al. disclose the claimed limitations except the claimed materials for the various layers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to change the material in order to change the output wavelength, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

21. Regarding claim 24, Sakata et al. disclose: p-type InP current blocking layer (37) is provided on both sides of the double hetero mesa stripe; p-type cladding layer (39) is formed above the double hetero mesa stripe (Figure 4, Col 6, Lines 1-67).

Response to Arguments

22. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to XNNING NIU whose telephone number is (571)270-

1437. The examiner can normally be reached on M-T, 7:30-5:00 EST, Alternate Fridays 7:30-4:00 ES.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Min Sun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Xinning(Tom) Niu/
Examiner, Art Unit 2828
07/29/2008

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828